CLAIMS

1. A method of producing an optical filter, characterized in that it comprises effecting the following steps on an optical waveguide (10):

- controlling the varying interior profile of the waveguide, and
- writing a Bragg grating (20),

using techniques allowing independent control of longitudinal variation of the Bragg wavelength and longitudinal variation of the exterior profile of the waveguide.

2. A method according to claim 1, characterized in that the step of controlling the varying interior profile of the waveguide is effected by melt-drawing.

3. A method according to claim 1 or claim 2, characterized in that it further comprises a step of adding to the optical waveguide comprising a written filter a device for commanding or controlling an applied mechanical force.

4. A method according to claim 3, characterized in that it comprises a step of adding to the optical waveguide means adapted to apply controlled traction.

5. A method according to claim 3, characterized in that it comprises a step of adding to the optical waveguide means adapted to apply controlled torsion.

6. A method according to any one of claims 1 to 5, characterized in that the step of controlling the varying interior profile of the optical waveguide (10) is adapted to control the longitudinal variation of the effective optical index of the waveguide.

7. A method according to any one of claims 1 to 6,

characterized in that the step of controlling the varying interior profile of the optical waveguide is effected under conditions allowing control of the longitudinal variation of the effective optical index of the waveguide, the step of controlling the varying interior profile of the waveguide is followed by a step of locally correcting the exterior profile of the waveguide, and the step of writing the Bragg grating is effected under conditions that enable longitudinal control of the Bragg wavelength.

8. A method according to claim 7, characterized in that the step of writing the Bragg grating consists in producing a constant period or linear grating.

9. A method according to claim 7 or claim 8, characterized in that the step of correcting the exterior profile of the waveguide is effected before the step of writing the Bragg grating.

10. A method according to claim 7 or claim 8, characterized in that the step of correcting the exterior profile of the waveguide is effected after the step of writing the Bragg grating.

11. Method according to any one of claims 7 to 10, characterized in that the correction step consists in removing material from the exterior profile of the waveguide.

12. Method according to any one of claims 7 to 10, characterized in that the step of correcting the exterior profile consists in adding material to the exterior profile obtained after the step of controlling the varying interior profile of the waveguide.

13. A method according to any one of claims 1 to 5, characterized in that the step of controlling the varying interior profile of the waveguide is adapted to control

the required exterior profile.

14. A method according to claim 13, characterized in that the step of controlling the varying interior profile of the optical waveguide is effected under conditions enabling control of the longitudinal variation of the exterior profile of the waveguide and the longitudinal variation of the step of the grating is controlled during writing of the Bragg grating to enable control of the longitudinal variation of the Bragg wavelength.

15. A method according to any one of claims 7 to 14, characterized in that the step of writing the Bragg grating is adapted to define a variable period.

16. A method according to any one of claims 1 to 15, characterized in that the steps of controlling the varying interior profile of the waveguide and writing the Bragg grating are adapted to define a longitudinal linear variation of the Bragg wavelength.

17. A method according to any one of claims 1 to 16, characterized in that the steps of conforming the exterior profile of the waveguide are adapted to define a non-linear variation of the exterior profile.

18. A method according to claim 15, characterized in that the steps of conforming the exterior profile of the waveguide are adapted to define an exterior profile whose cross section conforms to the following equation, in which S_0 and p are constants and z defines the longitudinal axis:

$$S(z) = \frac{S_o}{1 + p.z}$$

19. A method according to any one of claims 1 to 18,

characterized in that it further comprises a step of adding to the optical waveguide means for inducing a uniform longitudinal variation of the wavelength.

20. A method according to claim 19, characterized in that it consists in adding to the optical waveguide means adapted to control the temperature of the component.

21. A method according to claim 19 or claim 20, characterized in that it further comprises a step of depositing on the exterior surface of the waveguide an electrically or thermally conductive material, for example a metallization.

22. A method according to claim 21, characterized in that the thickness of the conductive material deposit is non-uniform.

23. A method according to claim 22, characterized in that the longitudinal variation of the deposit thickness is inversely proportional to the cross section of the waveguide.

24. A method according to claim 19 or claim 20, characterized in that it includes placing the waveguide in a microfurnace.

25. A method according to any one of claims 1 to 24, characterized in that the Bragg grating (20) is written after the operation of controlling the varying interior profile of the waveguide.

26. A method according to any one of claims 1 to 25, characterized in that the optical waveguide is an optical fiber.

27. A method according to any one of claims 1 to 26,

characterized in that the waveguide is an optical fiber in which three regions may be distinguished: doped core, doped inner cladding, and silica outer cladding.

28. A method according to any one of claims 1 to 27, characterized in that it is adapted to enable inversion of the sign of the compensation as a function of an applied mechanical force.

29. A method according to any one of claims 1 to 28, characterized in that the step of writing the Bragg grating includes controlling the modulation amplitude of the index during writing.

30. A method according to claim 29, characterized in that the modulation amplitude is progressively reduced at the edges of the grating to apodize the spectral response.

31. A method according to claim 29, characterized in that the index modulation is overmodulated to create a plurality of reflective bands.

32. A method according to any one of claims 1 to 31, characterized in that a Bragg grating is written generating two reflective bands whose spectral spacing corresponds to the offset produced by a force necessary for inverting the sign of the dispersion.

33. A filter obtained by using the method according to any one of claims 1 to 32.

34. A filter according to claim 33, characterized in that it comprises an optical waveguide produced in whole or in part by controlling the varying interior profile of the waveguide comprising a Bragg grating in such a way that the longitudinal variation of the Bragg wavelength and the longitudinal variation of the exterior profile are

controlled independently.

35. A filter according to claim 34, characterized in that the optical waveguide is made in whole or in part by a melt-drawing process.

36. A filter according to claim 33 or claim 35, characterized in that it constitutes a reflective component.

37. A filter according to any one of claims 33 to 36, characterized in that its exterior profile is obtained by modifying the profile obtained after the step of controlling the varying interior profile of the waveguide.

38. A filter according to any one of claims 33 to 36, characterized in that its exterior profile is obtained by controlling the varying interior profile of the waveguide.

39. A filter according to claim 37, characterized in that the Bragg grating has a constant or linear period.

40. A filter according to claim 37 or claim 38, characterized in that the Bragg grating has a varying period.

41. A filter according to any one of claims 33 to 40, characterized in that the longitudinal variation of the Bragg wavelength is linear.

42. A filter according to any one of claims 33 to 41, characterized in that it comprises temperature control means.

43. A filter according to any one of claims 33 to 42,

characterized in that it comprises a deposit of an electrically or thermally conductive material, for example a metallic deposit.

44. A filter according to any one of claims 33 to 42, characterized in that it is placed in a microfurnace.

45. A filter according to any one of claims 33 to 44, characterized in that the waveguide is made from birefringent material.

46. A filter according to claim 45, characterized in that the waveguide has a birefringence $\Delta n \geq 10^{-5}$.

47. A filter according to any one of claims 33 to 46, characterized in that the photosensitivities of the core and the inner cladding of the waveguide are similar and the radius of the inner cladding is more than three times that of the core.

48. A filter according to any one of claims 33 to 47, characterized in that the waveguide is formed of an stretched silica cladding fiber.

49. A filter according to any one of claims 33 to 48, characterized in that it comprises force application means based on one or more piezo-electric cells.

50. A filter according to any one of claims 33 to 48, characterized in that it comprises force application means based on one or more step-up motors.

51. A filter according to any one of claims 33 to 50, characterized in that it comprises means for measuring optical properties of the component or the transmission quality for applying feedback to control the applied force.

52. A system comprising a filter according to any one of claims 33 to 51 and means for applying a controlled mechanical force thereto.

52. A system according to claim 52, characterized in that it comprises a splitter (100) such as a three-port circulator associated with a filter for extracting the output signal.

54. A system according to claim 52, characterized in that it comprises a multiplexer-demultiplexer (131) associated with a plurality of filters for filtering independently a plurality of channels or sub-bands.

55. A system according to claim 52, characterized in that it comprises at least two filters of which at least one is preferably tunable.

56. A system according to claim 55, characterized in that it comprises a four-port circulator with two intermediate ports connected to respective filters (F1, F2).

57. A system according to claim 55, characterized in that it comprises two three-port circulators with intermediate ports connected to respective filters (F1, F2), the output of the first circulator being connected to the input of the second.

58. A system according to claim 52, characterized in that it comprises a plurality of filters in series.

59. A system according to any one of claims 52 to 58, characterized in that it comprises means (104, 106, 108) for measuring optical properties of the component or the transmission quality for applying feedback to control the force.